

Claims

1. A power unit for conveyance comprising a main power source and a stand-by power source, wherein a thermal battery is provided as the stand-by power source.

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2. The power unit for conveyance as set forth in claim 1, comprising: a first switch means for detecting voltage of the main power source to conduct a switch operation; an activation device for having continuity with the main power source when the relevant first switch means operates, to activate the thermal battery; a backup power source parallelly connected to the main power source through a diode; and a second switch means located between the relevant backup power source and the activation device, for switching connection status between the backup power source and the activation device.

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3. The power unit for conveyance as set forth in claim 1 comprising: a first switch means for detecting voltage of the main power source to conduct a switch operation; a constant current circuit to which power is supplied from the main power source by a switch operation of the relevant switch, for supplying constant current to the thermal battery; and an energy storage means for supplying backup power to the constant current circuit when power from the main power source is shut off.

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4. The power unit for conveyance as set forth in claim 1, comprising: a backup power source connected to the main power source through a power supply wire; a thermal battery ignition circuit for activating the thermal battery by electric power from the relevant backup power source; a voltage conversion circuit connected to the power supply wire, for allowing selectively either the voltage of the main power source to increase and to be supplied to the backup power source side, or the voltage of the backup power source side to decrease and to be supplied to the main power source; a thermal battery ignition control circuit connected to the power supply wire between the main power source and the voltage conversion circuit, which operates by electric power from the relevant power supply wire, for controlling the thermal battery ignition circuit in response to voltage decrease of the main power source to activate the thermal battery during operation; a diagnosis circuit connected to the power supply wire between the main power source and the voltage

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conversion circuit, which operates by electric power from the relevant power supply wire, for diagnosing for activation of the thermal battery; a disconnection detection circuit which has a connection point between the main power source and the voltage conversion circuit, for detecting disconnection of the power supply wire between the relevant connection point and the main power source; a voltage increase/decrease control circuit controlled by the relevant disconnection detection circuit, for allowing the voltage conversion circuit to increase the voltage of the main power source side to supply to the backup power source side in a state such that disconnection of the power supply wire is not detected, and for allowing the voltage conversion circuit to decrease the voltage of the backup power source side to supply to the main power source side in a state such that disconnection of the power supply wire is detected; and an operation stop control circuit for stopping operation of the diagnosis circuit in response to detection of the power supply wire disconnection by the disconnection detection circuit.

5. The power unit for conveyance as set forth in claim 4, wherein a resistance circuit is employed as the diagnosis circuit and a shutoff circuit is employed as the operation stop control circuit; the resistance circuit is a circuit connected so that electric power is supplied from the above backup power source, for applying a voltage between both ends of a part for activating the above thermal battery so as to diagnose the part for activating the above thermal battery; and the shutoff circuit is a circuit for shutting off electric power supply from the above backup power source to the resistance circuit in response to detection of the power supply wire disconnection by the above disconnection detection circuit.

6. The power unit for conveyance as set forth in claim 1, comprising: a main power source abnormality detection means for detecting abnormality of the main power source; an auxiliary power source means which is a power source means for supplying electric power for start to the thermal battery, different from a battery located in the main power source; and a control means for controlling so that electric power for start is supply from the auxiliary power source means to the thermal battery in case the main power source abnormality detection means detects abnormality of the main power source.

7. The power unit for conveyance as set forth in claim 1, wherein the main power source is provided with a main storage battery whose negative electrode is grounded and a generator whose negative electrode is grounded, comprising: a first condenser whose positive electrode is connected to a positive electrode of the main storage battery and whose negative electrode is grounded; a second condenser whose positive electrode is connected to the positive electrode of the main storage battery through a positive electrode side current limiting resistor, and whose negative electrode is grounded through a negative electrode side current limiting resistor; a thermal battery activation circuit one of whose terminals is connected to the positive electrode of the main storage battery through a voltage sensor for detecting voltage decrease of the power source to close electrically, and the other terminal is connected to the negative electrode of the second condenser; a diode whose anode is connected to the other terminal of the thermal battery activation circuit, and whose cathode is connected to the positive electrode of the second condenser; a main switch for grounding the positive electrode of the second condenser when closing; and a control unit for closing the main switch by detecting voltage decrease of the main power source.

8. The power unit for conveyance as set forth in claim 1, wherein the main power source is provided with a main storage battery whose negative electrode is grounded and a generator whose negative electrode is grounded, comprising: a DC-DC converter whose negative electrode is grounded, for increasing voltage of the main storage battery; a first condenser whose positive electrode is connected to a positive electrode of the DC-DC converter, and whose negative electrode is grounded; a second condenser whose positive electrode is connected to the positive electrode of the DC-DC converter through a positive electrode side current limiting resistor, and whose negative electrode is grounded through a negative electrode side current limiting resistor; a thermal battery activation circuit one of whose terminals is connected to the positive electrode of the DC-DC converter through a voltage sensor for detecting voltage decrease of the main power source to close electrically, and the other terminal is connected to the negative electrode of the second condenser; a sub switch for grounding the other terminal of the thermal battery activation circuit through a diode for negative voltage protection, when closing; a main switch, which is the main switch, for grounding the positive electrode of the second condenser when the main

switch closes; and a control unit for closing the sub switch when detecting voltage decrease of the main power source, and for closing the second switch in a prescribed amount of time after closing the main switch.

5 9. The power unit for conveyance as set forth in claim 1, wherein a circuit for limiting ignition electric current carried to a thermal battery activation circuit for activating the thermal battery is provided; the circuit for limiting ignition electric current comprising: a semiconductor integrated circuit in which a thermal battery activation circuit ignition drive circuit is formed; a reference power supply formed in the semiconductor integrated
10 circuit; a pull-down resistor connected to the outside of the semiconductor integrated circuit, to which electric current is supplied from the reference power supply; and an electric current limitation circuit formed inside the semiconductor integrated circuit, for limiting value of ignition electric current carried to the thermal battery activation circuit within a predetermined range, with value of reference electric current supplied from the
15 reference power supply to the pull-down resistor as reference.

10. The power unit for conveyance as set forth in claim 1, wherein a circuit for limiting ignition electric current carried to a thermal battery activation circuit for activating the thermal battery is provided, and a thermal battery activation circuit ignition drive circuit,
20 an electric current detection resistor through which thermal battery activation circuit ignition electric current flows, a constant current source, a pull-down resistor through which electric current from the constant current source flows; an electric current limitation circuit for limiting ignition electric current value detected based on potential difference between both ends of the electric current detection resistor within a
25 predetermined range based on potential difference between both ends of the pull-down resistor, are further provided in the same semiconductor integrated circuit.

11. The power unit for conveyance as set forth in claim 1, wherein a circuit for limiting ignition electric current carried to a thermal battery activation circuit for activating the
30 thermal battery is provided, and a semiconductor integrated circuit in which a thermal battery activation circuit ignition drive circuit is formed and a time limitation means

connected to outside of the semiconductor integrated circuit, for limiting current carrying time of ignition electric current to a predetermined time.

12. The power unit for conveyance as set forth in claim 1, comprising: a main power source abnormality detection means for detecting abnormality of the main power source; and a sub power source means for supplying power to outside after abnormality is detected by the relevant main power source abnormality detection means.

13. The power unit for conveyance as set forth in claim 1, comprising: a main power source abnormality detection means for detecting abnormality of the main power source; a stand-by power source which is provided with a thermal battery for supplying power to outside when the main power source abnormality detection means detects power supply abnormality; and a stand-by power source abnormality detection means for detecting power supply abnormality in the relevant stand-by power source; and a warning means for giving warning when abnormality in the stand-by power source is detected by the stand-by power source abnormality detection means at least either before or after the relevant conveyance starts.

14. A conveyance comprising an electronic control system and the power unit for conveyances as set forth in claims 1,2,3,4,5,6,7,8,9,10,11,12 or 13, which is constituted so that electric power for operating the electronic control system is supplied from the power unit for conveyance to the electronic control system.